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Title: Simulations of Laser Experiments at the QED Frontier

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# Simulations of Laser Experiments at the QED Frontier

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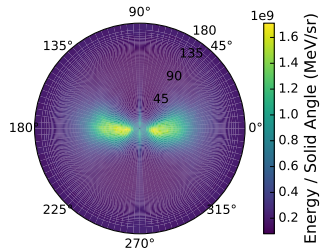
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# High-energy photons emitted into two 'jets'

- Simulations of certain experimental configurations using QED models show photons are directed into narrow 'jets'
- Jets are split along laser polarization
- No wavelength-scale structure in target needed

Photon Energy Deposition  
 $E_\gamma > 1 \text{ MeV}$



Simulation parameters:  $60n_{cr}$ ,  $10 \mu\text{m}$  carbon target,  $T_e = 10 \text{ keV}$ ,  $T_i = 10 \text{ eV}$ ,

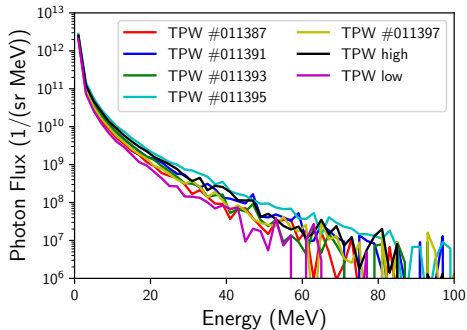
$I_0 = 3.02 \times 10^{23} \text{ W/cm}^2$ , FWHM = 150 fs, F/1.0, S-polarized, 60  $e^-$  and 20  $C^{6+}$  per cell, 10 nm cell size



# Simulations with laser parameters from real shots predict variations in QED production

- Pulse energy varies from 85.3–100.4 J
- Intensity varies from  $1.86\text{--}2.54 \times 10^{22} \text{ W/cm}^2$
- Highest energy pulse does not produce highest flux jet
- Laser instability about doubles simulation-to-simulation differences
- These fluxes should be detectable in experiments; would be first observation of photons from this method

Photon Spectra  $(\theta, \phi) = (20, 0)$



Simulation parameters:  $60n_{cr}$ ,  $10 \mu\text{m}$  carbon target,  $T_e = 10 \text{ keV}$ ,  $T_i = 10 \text{ eV}$ ,  $1.25 \mu\text{m}$  spot size, S-polarized, 60 electrons and ions per cell, 10 nm cell size

